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NOISE MEASUREMENT AT SHAFTS NO. 1 AND NO. 2 AT DENISON MINES LTD. ELLIOT LAKE

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NOISE MEASUREMENT AT SHAFTS NO. 1 AND NO. 2 AT DENISON MINES LTD. ELLIOT LAKE

by

M.U. Savich*

ABSTRACT

Noise measurements were taken during the reconstruction period at Shafts No. 1 and No. 2 using a Statistical Distribution Analyzer, B and K Type 4420.

Even though the noise measured was below 90 dBA in all operator's cabs, greater efforts must be made to decrease noise, particularly at the hoist for men at shafts No. 1 and No. 2. It would be desirable to attain noise levels below 70 dBA. A reduction of 10 to 13 dBA was obtained, however, problems remain to be solved. Recommendations on how to deal with noise in cabs are included.

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MESURE DU NIVEAU DE BRUIT AUX PUITS NO. 1 ET NO. 2 À LA MINE DENISON MINES LTD. À ELLIOT LAKE

par

M.U. Savich*

RÉSUMÉ

On a effectué des mesures du niveau de bruit lors de la période de reconstruction aux puits no. 1 et no. 2 en utilisant un analyseur statistique du niveau de bruit de type 4426 B et K.

Bien que toutes les mesures prises dans les cabines des opérateurs se situaient au dessous de 90 dBA, on doit faire davantage d'efforts pour diminuer le niveau de bruit, en particulier au treuil d'extraction des puits no. 1 et no. 2. Il serait désirable d'abaisser le niveau de bruit au dessous de 70 dBA. On a réussi à réduire le niveau de 10 à 13 dBA, quoiqu'il reste encore des problèmes à résoudre. On a aussi inclus des recommandations au sujet de bruit dans les cabines des machinistes.

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INTRODUCTION

The expansion at Denison Mine includes installation of three major conveyors, each exceeding 600 m (1). One of the conveyors will transport ore produced in the upper reefs to the No. 1 shaft hoisting facilities which have been rehabilitated. The other two conveyors will transport ore from the new mining areas of the main zone and also from future mining areas. These conveyors feed an underground crushing plant at the No. 2 shaft. Activation of shaft No. 1 was a part of a reconstruction program undertaken to improve ore quality.

Noise measurements were taken during the reconstruction period using a Statistical Distribution Analyzer, B and K Type 4420. This instrument has five selectable rates, more than 24 hours continuous operation at fastest sampling rate and digital display in twelve classes presenting counting time in three counting modes. The noise is irregular in character and a statistical approach was used to express a behaviour otherwise difficult to describe. Noise exposure might be taken as a typical example: one measurement at a particular time is almost meaningless.

SHAFT NO. 1

Measurements of noise at the hoist for ore (skip) were taken 'in cab' and 'out cab' for the identical number of trips (Fig. 1 and 2), (Appendix A):

Shift	Number of Trips	
	July 17, 1979	July 18, 1979
1	21	74
2	30	36
3	77	18
Σ	128	128

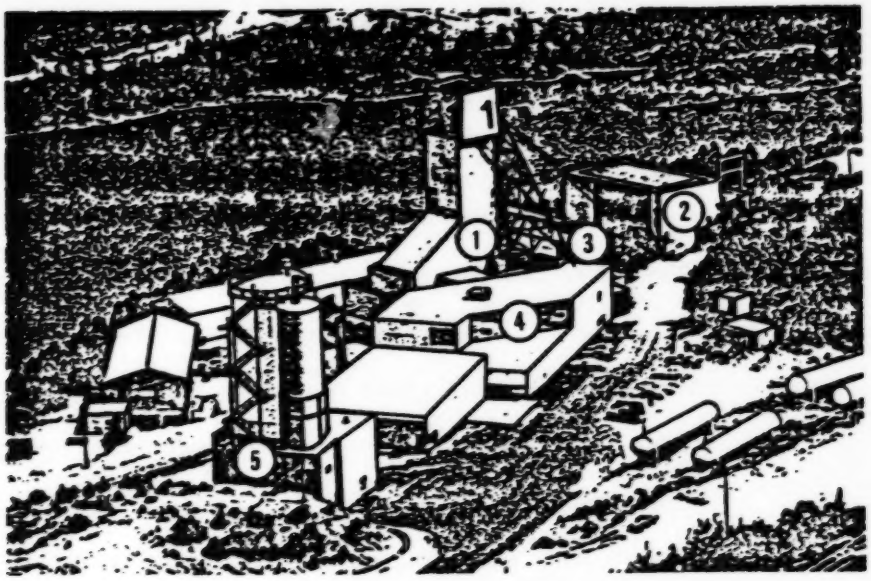

Fig. 1: Shaft No. 1 area: (1) Headframe, (2) Hoist room (cage and skip), (3) Lamp room, shift boss office and general mine offices, (4) Engineering offices and change rooms, and (5) Backfill plant.

This location was considered the best for the accurate measurement of the attenuation of the cab for the following reasons:

1. the hoist room is isolated from secondary sources of noise;
2. there is no work force activity; and
3. the cab was constructed at Denison Mine.

The second and third shift measurements are together, however, this has no bearing on the total evaluation of the results. The number of trips per shift varies and this is an important factor in the evaluation of the total attentuation.

From Fig. 2 it may be concluded that the total attenuation averages 17 to 18 dBA. 'In cab' noise usually does not exceed 80 dBA. Noise greater than 80 dBA 'in cab' lasts 5 to 8 minutes over a shift, and this corresponds to the time during which the cab door is open. The attenuation is acceptable in this application.

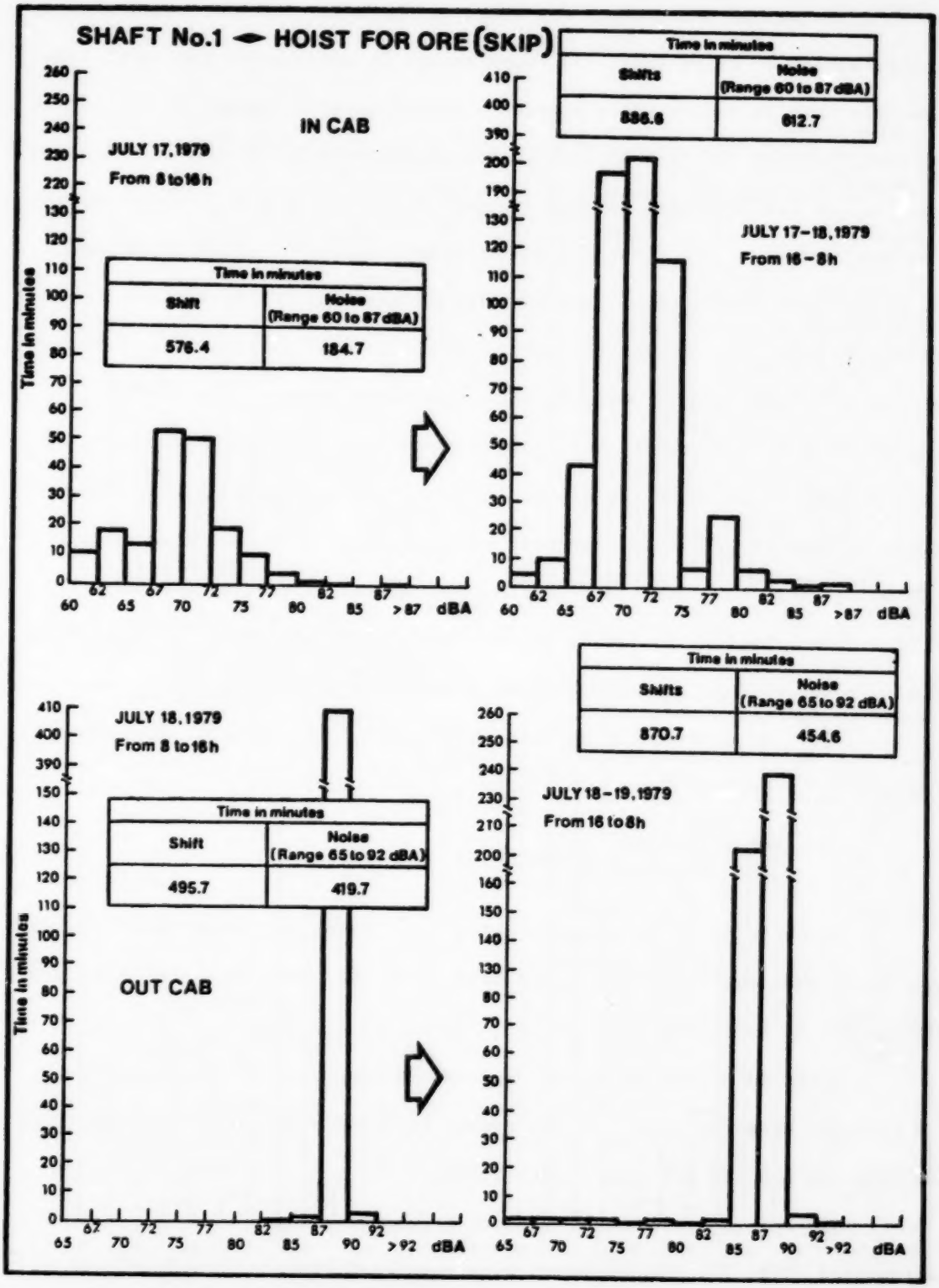

Fig. 2 - Measurement of noise at hoist for ore (skip).

The second measurement was taken at the hoist for men (cage) with a similar number of trips (Fig. 3). Compressors in and outside the hoist room were important secondary noise sources. Extensive activity of the work force was steady during the test period. Measurements were recorded using the same procedure as for the hoist for ore (skip). Results of 'in cab' and 'out cab' show two maximums. The first maximum results from the hoist machinery and the second from compressors. The results differed significantly from those previously recorded. During the first shift, 'in cab' noise exceeded 80 dBA for nearly 2 hours and exceeded 90 dBA for a few minutes. This type of job requires a quiet environment and maximum concentration. The operator on this occasion complained about the air conditioners and his seat. With further reconstruction is is likely that this will be resolved and new measurements will be required to assess this problem. From the point of view of OSHA (= Ontario Regulations) it would not be possible to find fault in these noise levels, however, experience shows that maximum reliable quiet and attenuation are required. Attenuation of the cab varies from 10 to 13 dBA. The cab was constructed in Denison Mines.

SHAFT NO. 2

At Shaft No. 2 noise measurements were completed as follows: in the cage hoist and compressor room, skip hoist room, at shaft deck area and shaft engineering offices (Fig. 4).

Detailed measurements were previously completed at crushing plant - jaw crusher, crushing plant - cone crusher and shop area, south transfer house and fine ore bin and grinding plant (2,3).

Two hoists are used for the ore transport and are used in parallel as required (Fig. 5). Measurements were completed 'in cab' and 'out cab' on

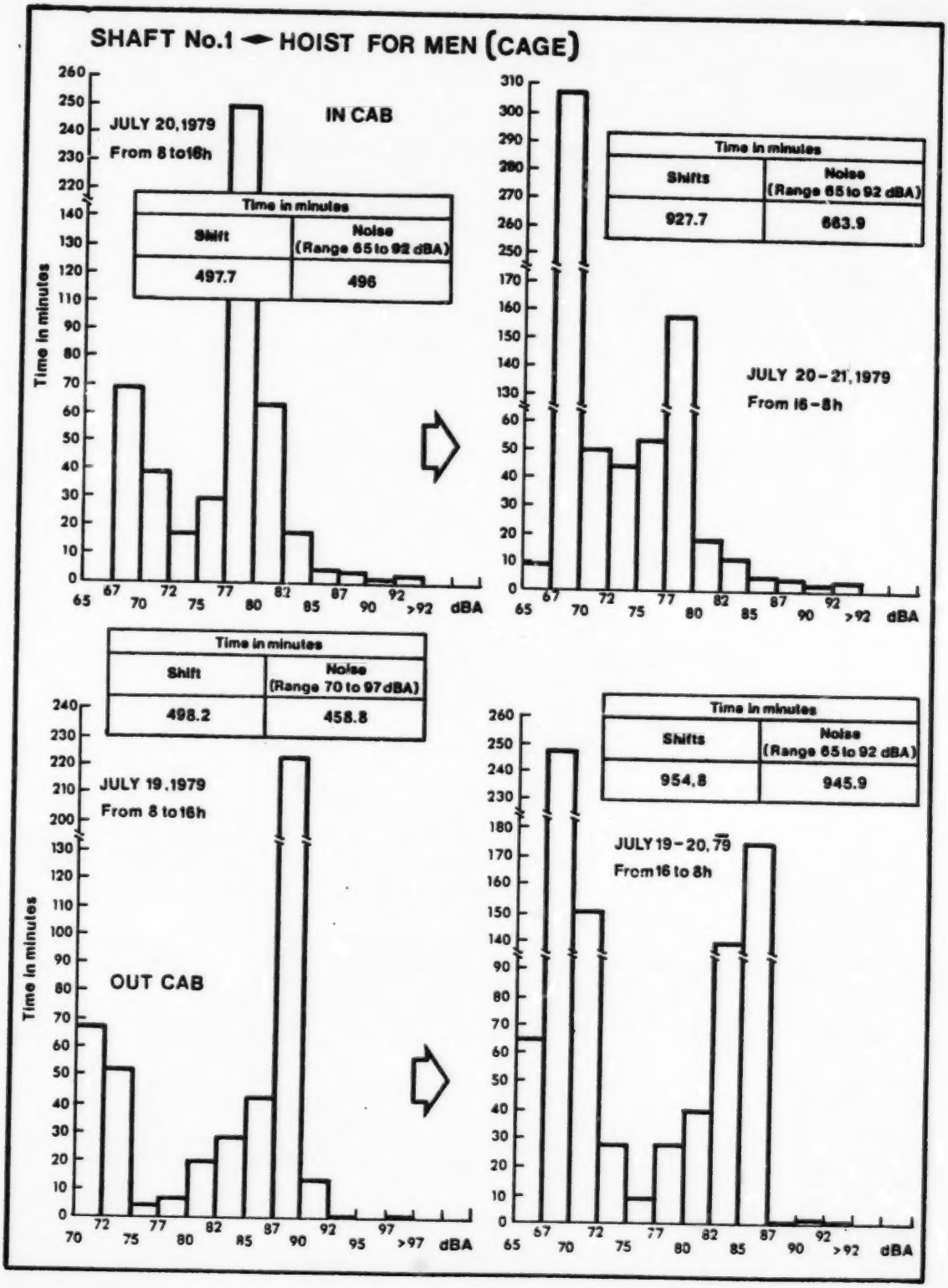

Fig. 3 - Measurement of noise at hoist for men (cage).

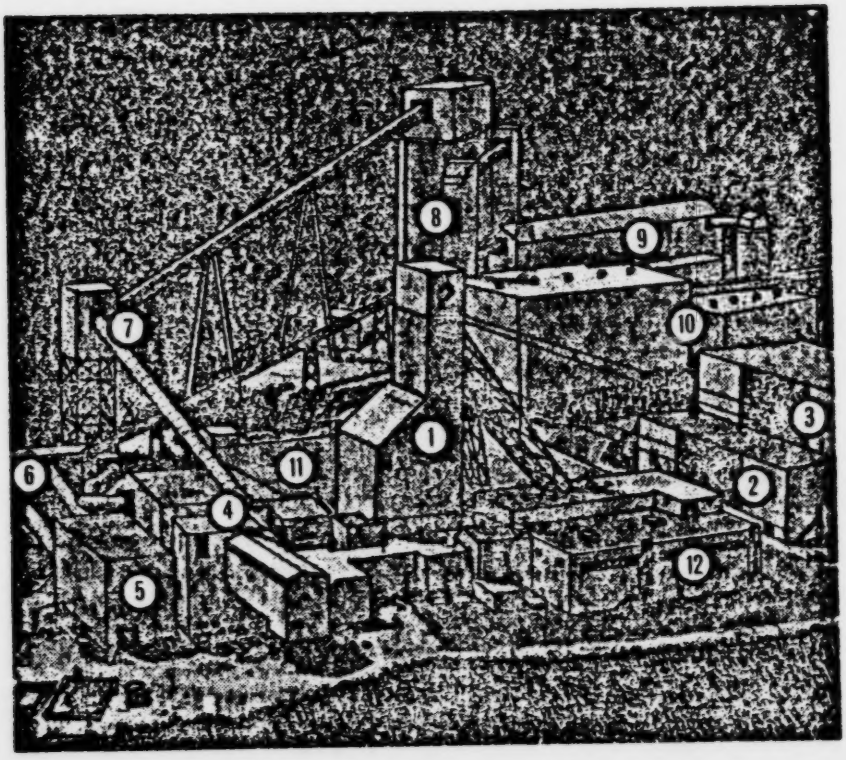

Fig. 4 - Shaft No. 2 area: (1) Shaft headframe, (2) Cage hoist and compressor, (3) Skip hoist, (4) Crushing plant - jaw crusher, (5) Crushing plant - cone crusher and shop area, (6) South transfer house, (7) South transfer tower, (8) Coarse ore storage, (9) Fine ore bin and grinding plant, (10) S.A.G. plant, (11) Shaft deck area, (12) Shaft engineering offices.

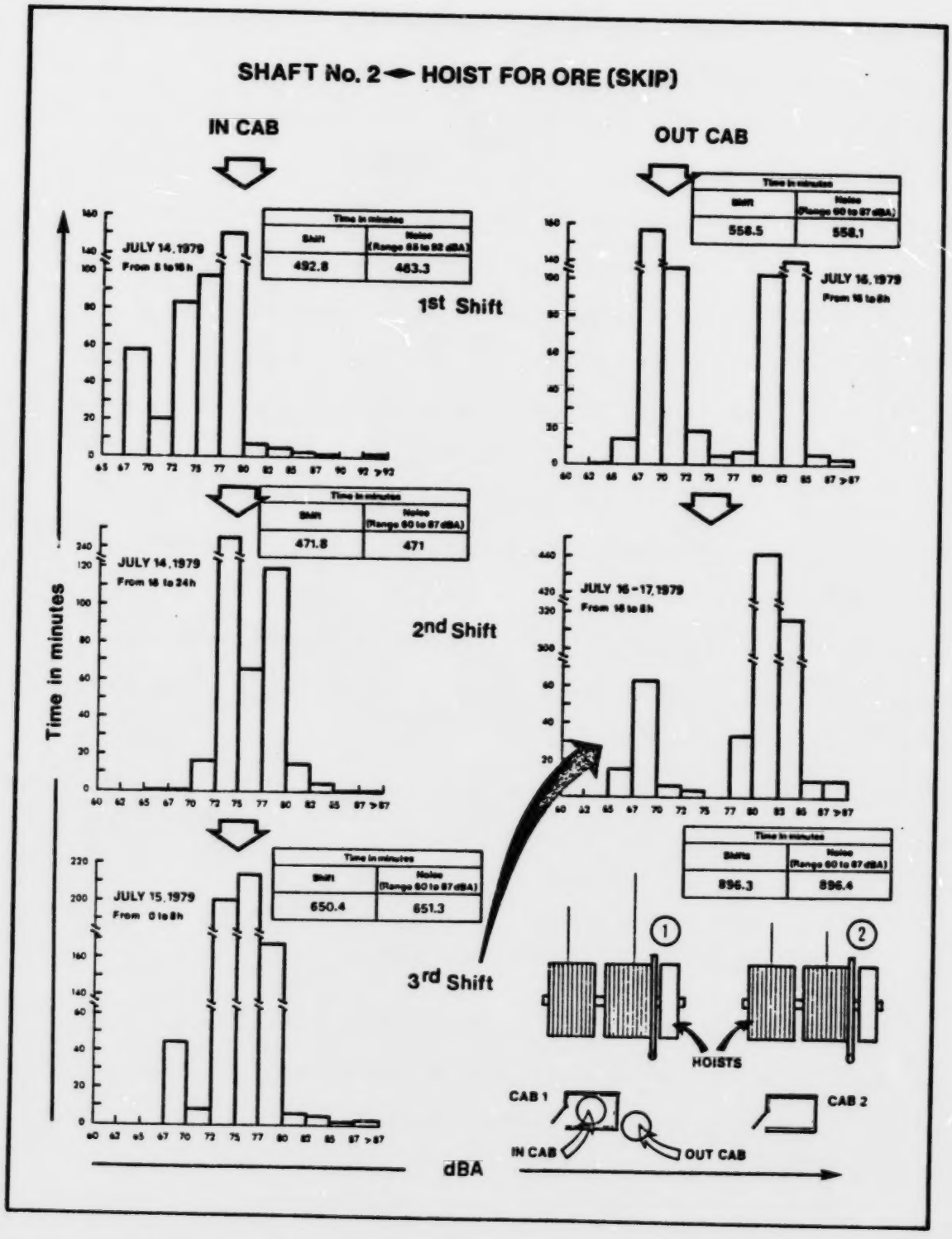

Fig. 5 - Measurement of noise at hoists for ore (skips).

hoist No. 1 (north hoist). Statistical analysis in all graphs show two maxima. The first results from hoist No. 2 (south hoist). Measurement of 'in cab' noise showed a maximum between 72 and 80 dBA. Both cabs are of identical construction, so readings were not taken in cab No. 2. 'In cab' noise is mainly below 80 dBA which complies with the standard. Operators usually leave the cab door open which decreases attenuation. The origin of these cabs is unknown.

In the large hoist room for men there is a hoist and a compressor (Fig. 4). Measurements were completed for three shifts individually due to the importance of the results (Fig. 6). The majority of the work force uses this hoist for transport underground. The large room lessens the noise from the compressor. This is the most sensitive and responsible of the hoist operators' positions. During the first shift measured 'in cab', two peaks are evident. The cab doors were open as the operator complained that the cab was too hot. This situation was repeated more or less on the subsequent shifts. This demonstrates the importance of air-conditioning. 'Out cab' noise was concentrated between 87 and 92 dBA. During the first and third shifts the intensity of noise was noticeably greater than during the second shift. This may be explained by the greater use of compressed air during intensive drilling activity.

NO. 2 SHAFT DECK AREA

The old floor plan of No. 2 shaft deck area is shown in Fig. 7. Measurements show that the noise decreases proportionally with increasing distance from the cage and crushing area. The shift boss's office is an exception to this trend; the reason was not investigated. This is a high traffic area for the work force particularly in the lamp area.

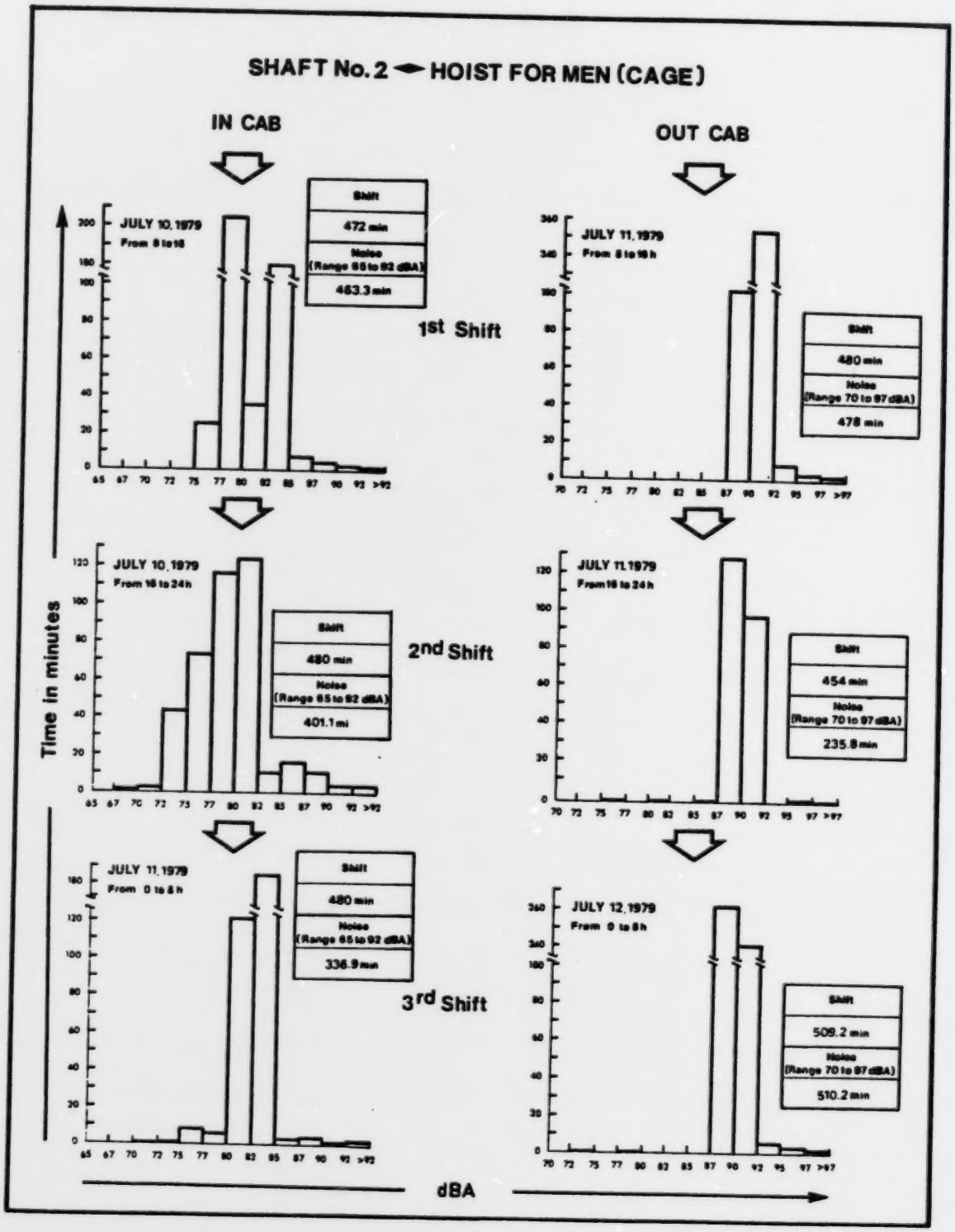

Fig. 6 - Measurement of noise at hoist for men (cage).

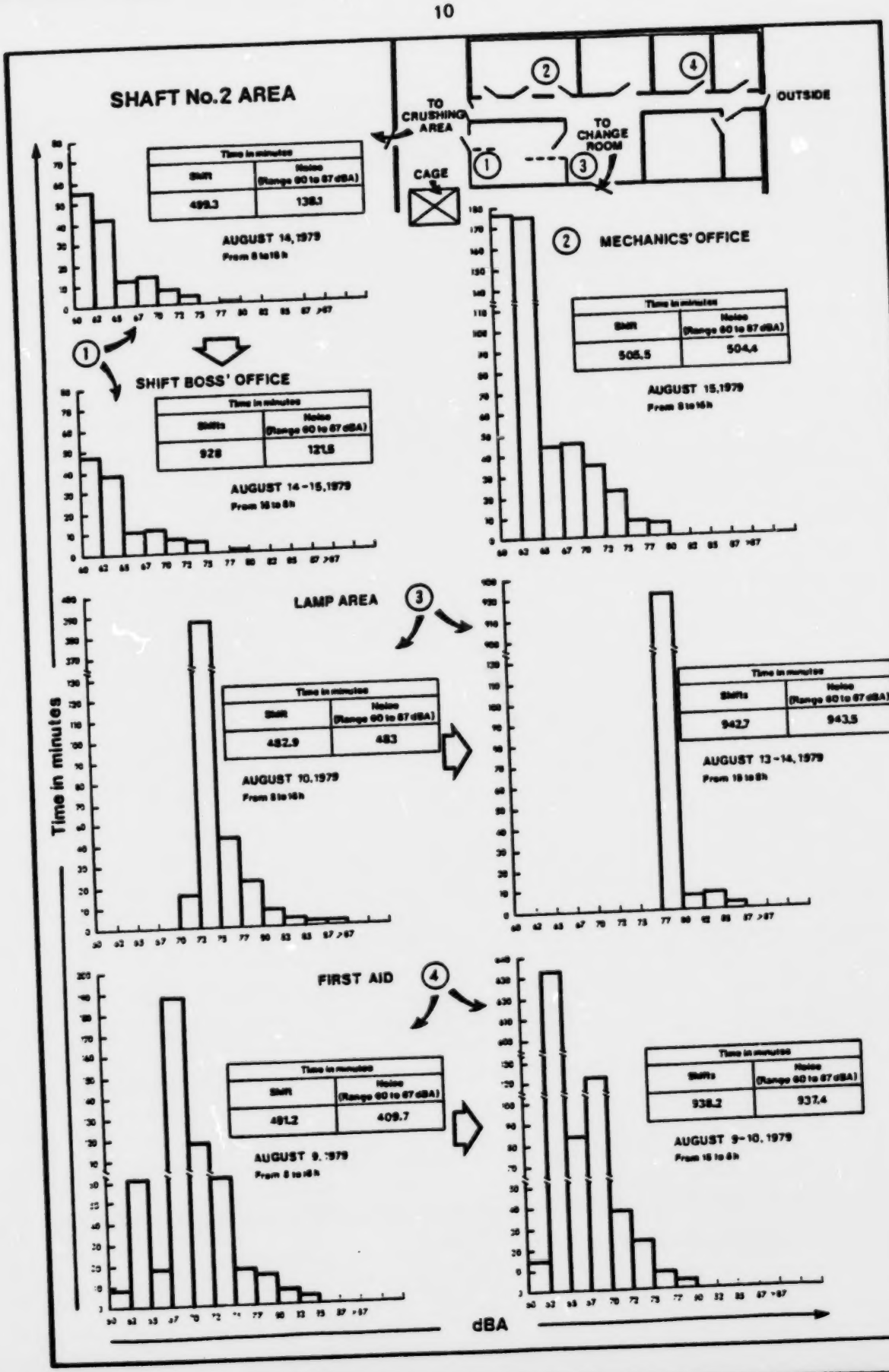

Fig. 7 - Noise measurement at No. 2 shaft deck area.

NO. 2 SHAFT ENGINEERING OFFICES

The objective of measurements was to establish which of the sources was a greater contributor to the noise level in the engineering offices, the compressor in the cage hoist room or the crushing plant (Fig. 4). Analysis of the results show the following (Fig. 8):

1. The noise level is always greatest during the first shift;
2. Statistical analysis of noise showed identical results in the centre of the engineering offices and near the windows in the lower right.
3. The mine superintendent's office is the quietest area of the engineering room.
4. Measurements outside windows showed a large increase in noise. The greatest noise source is at the side closest to the compressor.

It was commonly believed that the major source of noise in the engineering offices was the compressor station, however, results show that a large portion of the noise emanates from the crushing area.

CONCLUSION AND RECOMMENDATIONS

Even though the noise measured was below 90 dBA in all operators' cabs, greater efforts must be made to decrease noise, particularly at the hoist for men at shafts No. 1 and No. 2. It would be desirable to attain noise levels below 70 dBA. This may be achieved with better cabs. In the meantime better temperature control in the cab should be exercised and operators encouraged to keep the doors closed. In the room for hoists for ore (skips) noise in the cabs is almost always less that 80 dBA which may be considered as a good result for this type of work.

In the engineering room measurements should be repeated and should include measurements of vibration to determine the penetrating flows of noise

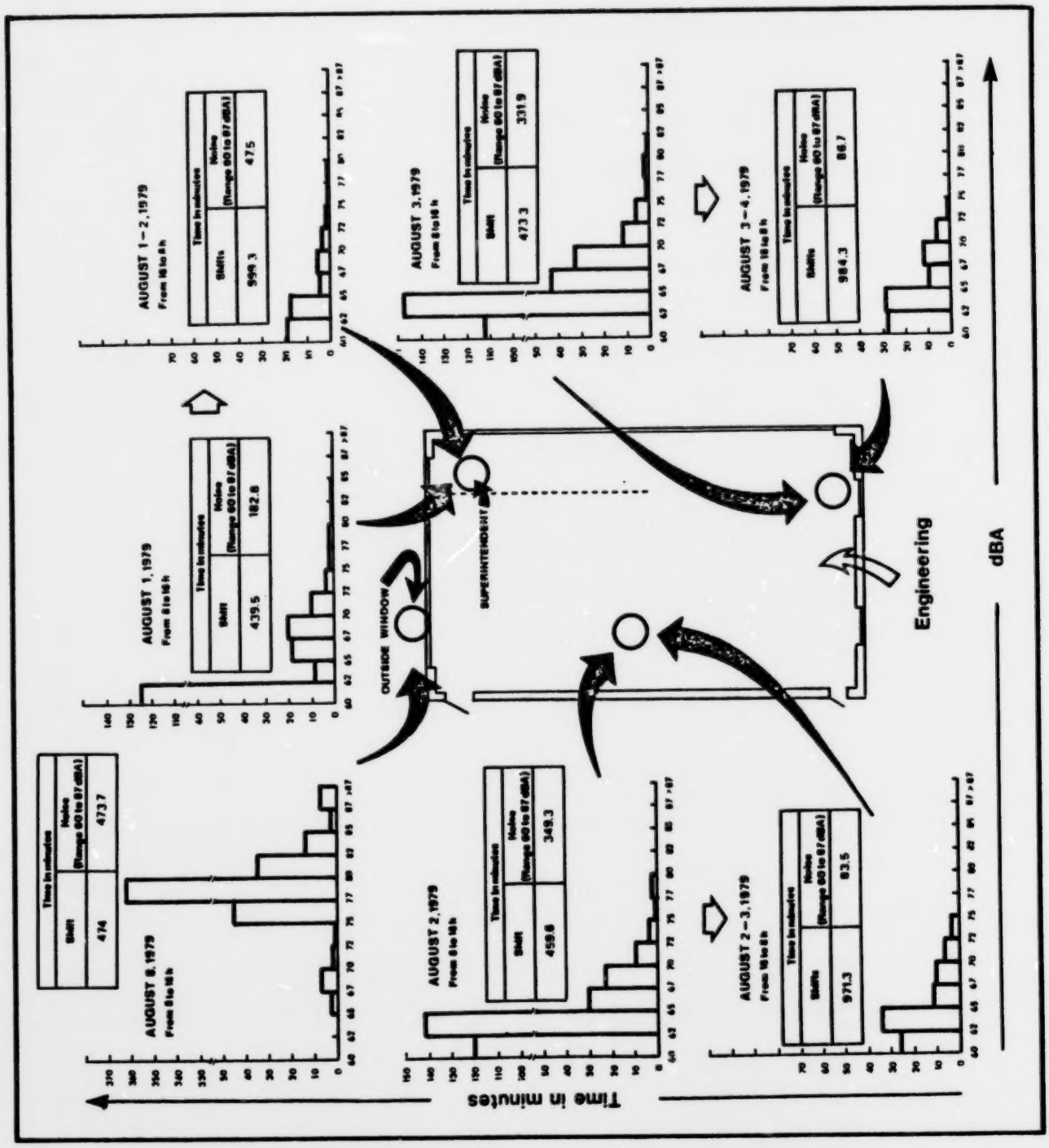

Fig. 8 - Noise measurement at No. 2 shaft engineering offices.

and vibration. This will have practical application in future planning of similar areas.

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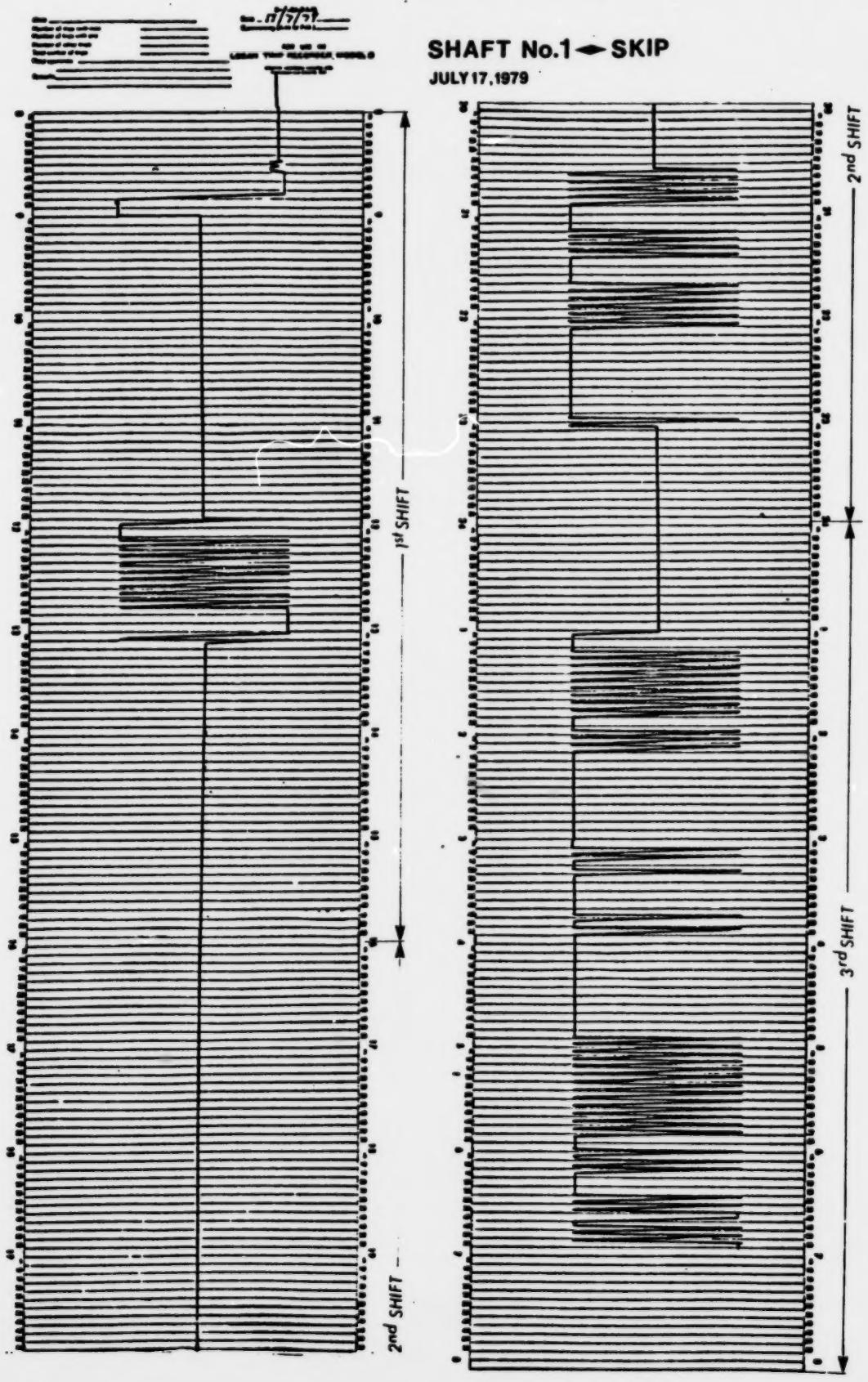
REFERENCES

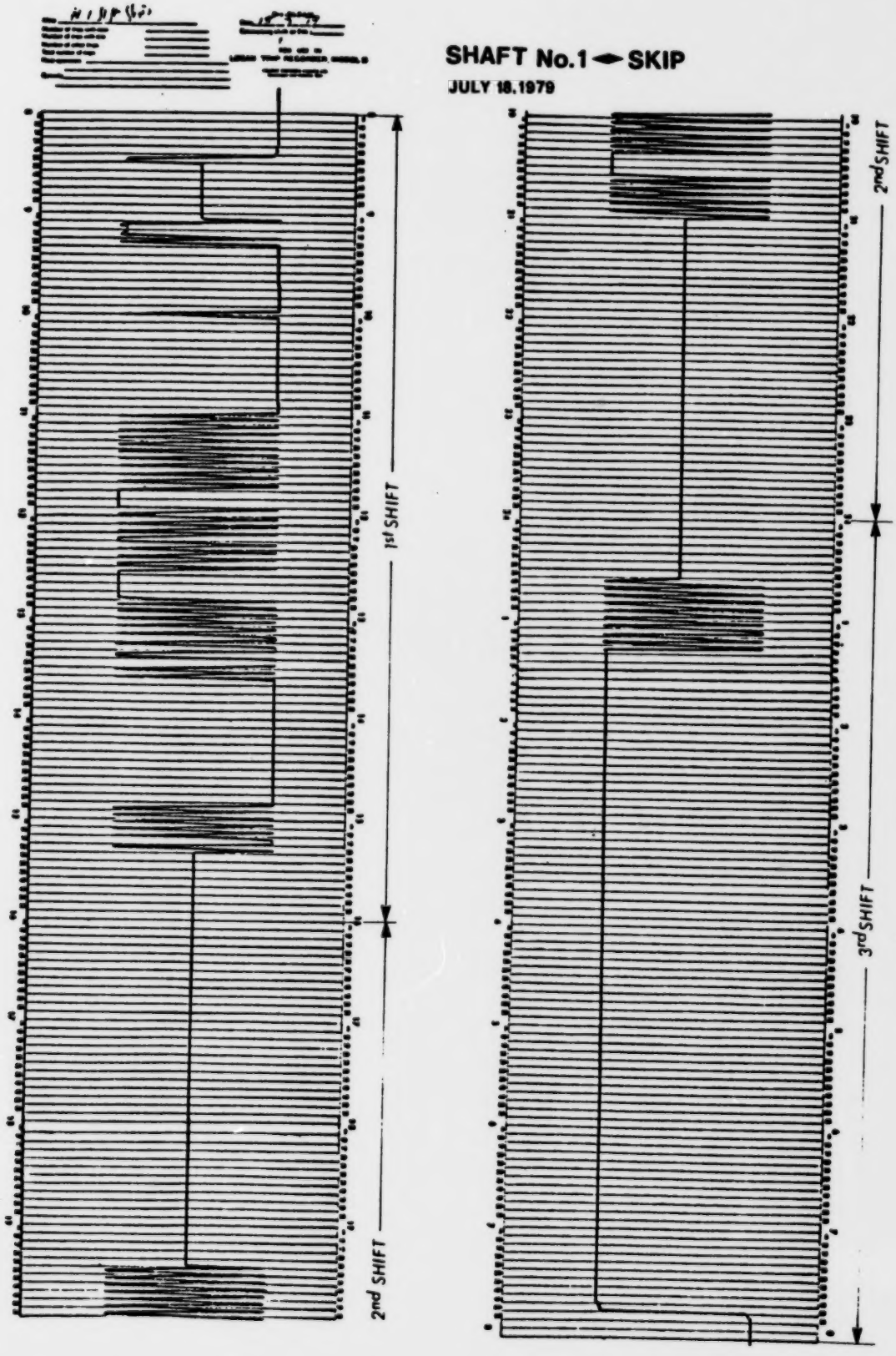
1. Denison Mines Ltd., Annual Report 1978.

2. Savich, M.U., "Noise measurement in the crushing and screening plant at Denison Mines Ltd. in Elliot Lake"; Division Report MRP/MRL 81-50(CF), CANMET, Energy, Mines and Resources Canada; April 1981.

3. Savich, M.U., "Noise measurement in grinding plant and coarse ore storage at Denison Mines Ltd. in Elliot Lake"; Division Report MRP/MRL 81-51(CF); CANMET, Energy, Mines and Resources Canada; April 1981.

Appendix A - Logan Trip Recorder




SHAFT No.1 ◄► SKIP
JULY 18,1979
1st SHIFT
2nd SHIFT
2nd SHIFT
3rd SHIFT